

PLANT WEST

ADVANCING CANADIAN MANUFACTURING

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Biodegradable BIOPLASTICS

TerraVerdae BioWorks pumps up PHA production with a green-friendly process

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CIEN

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Clinton's filthy distraction

Now that Hillary Clinton has weighed in on the Keystone XL project to the negative, we can officially add another high-end critic to the list of celebrities who have taken shots at the oil sands.

Neil Young was stunned by the scale of the oil sands operations and compared Fort McMurray to Hiroshima; Desmond Tutu described the oil sands as "filth"; James Cameron said it was a black eye on Canada's environmental record; and Leonardo DiCaprio, an oil sands eco-tourist, wants to fight to keep carbon in the ground.

Clinton, who hopes to secure the presidential nomination for the Democratic Party going into the next US federal election, is shrouding herself in green as a crusader against climate change, and she declared, "Time to invest in a clean energy future – not build a pipeline to carry our continent's dirtiest fuel across the US."

Let's put aside the fact that TransCanada's proposed 1,900 kilometre pipeline to the US Gulf Coast refineries would create jobs for Americans while reducing greenhouse gases, because without this mode of transit, the oil would be moved by fossil-fuel burning rail or barge; that the project was vetted and passed by the State Department twice; and that most Americans are in favour of the pipeline, or don't care, versus those against.

But "dirtiest" fuel?

That's a classic bit of political deflection. One could argue there is a dirtier fuel: coal, used mostly for generating electricity, and on this continent, much of it used by the US, which is the second largest greenhouse gas (GHG) emitter in the world with a 15% share, behind China's 24%. Canada contributes about 2% of the world's emissions and about 0.12% of that comes from the oil sands.

Let's run down some interesting facts about coal and energy use:

- Five countries account for 73% of the world's coal reserves, the US with the largest share at 26%, followed by Russia (18%), China (13%), Australia (9%) and India (7%).
- Coal fuels 41% of global electricity, 79% of China's electricity and 39% of the power used by the US (EPA 2013).
- Electric power is the largest source of energy-related CO2 emissions (ahead of transportation) in the US. Coal fuelled 76% of electricity-only power plants.
- The US burned more than 110 million short tons of coal in 2013 to generate electricity.
- Air pollution in the US from coal-fired power plants accounts for 13,000 premature deaths, 20,000 heart attacks and 1.6 million lost workdays, according to a study by the Clean Air Task Force (a non-profit entity that appears to be free of the wing-nutty variety of environmentalists, we checked!).

Full disclosure, Canada burns coal for electricity too: about 44 million tons by Alberta (74% of its power), Nova Scotia (73%) and Saskatchewan (60%). Ontario has eliminated coal as a power source.

To be fair, coal used for electricity is being phased out in the US in favour of natural gas (still fossil), and the damage is being mitigated by new scrubbing processes and carbon technology. But the Energy Department predicts coal will still be providing 34% of the nation's power by 2040.

That's pretty dirty, Ms. Clinton, and arguably of much greater concern than the distracting and questionable moral argument against moving oil sands production to US refineries by pipeline. Yes, Canada's oil sands developers need to push harder to reduce emissions. We don't need Clintonian finger wagging to get the job done.

Let's get real. The oil sands don't tip the balance of global climate change with a paltry 0.12%, even if production and emissions increase with additional development.

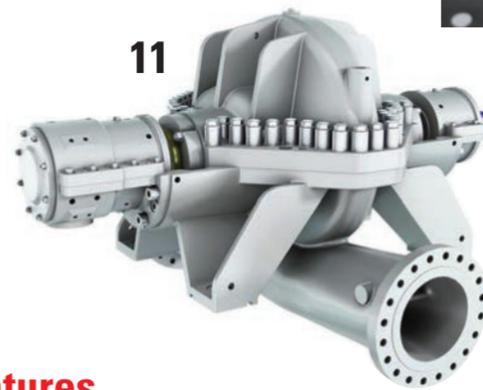
Clinton needs to focus on her own yard with its whopping 15% share of global emissions and America's filthy coal addiction.

Joe Terrett, Editor

Comments? E-mail jterrett@plant.ca.



COVER IMAGE: JEFF HILBRECHT



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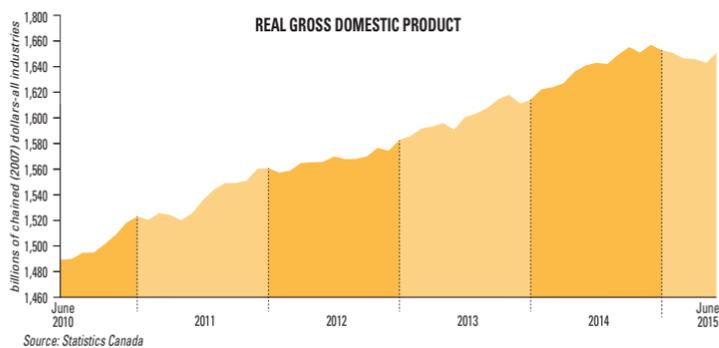
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» PLANT WEST PULSE



GROWTH CONTRACTS, BUT RECESSION TALK MISPLACED

Weakness in the energy sector continues to be a drag on the Canadian economy and the oil producing provinces. RBC Economics has downgraded its forecast of real GDP growth to 1.2% this year, below the 1.8% forecast in June, and 2.2% in 2016, down 0.4% from earlier predictions.

The economy contracted mildly in Q1 and Q2, but RBC Economics called the "flurry of recession talk" misplaced, describing the depth of the decline as marginal. Positive activity from other sectors will offset lost momentum, with exports accelerating as the US economy strengthens against a weakening loonie.

WESTERN HIGHLIGHTS

BC

+2.9%



Consumer spending and strong housing market activity will drive BC's leading growth this year by 2.9%, with 3.1% growth in 2016. Softer prospects in Asia for products such as copper and coal are tempering activity in some export sectors, but domestic demand continues to benefit from rising housing valuations, low gasoline prices and relatively inexpensive borrowing costs.

Impressive gains in nominal lumber exports to the US are helping to keep merchandise exports slightly above year-ago levels.

ALBERTA

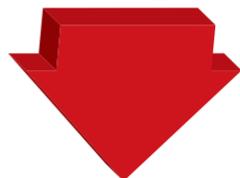
-1.3%



Alberta's economy is expected to contract by 1.3% this year, but return to more positive territory in 2016 with 0.6% GDP growth. Layoffs in the energy sector have been met by strong public sector hiring gains. But additional downward pressure will prompt firms to accelerate job cuts through the rest of the year.

SASKATCHEWAN

-1.6%



Significant drought conditions weakened Saskatchewan's economic growth this year, contracting by 0.6%. That's down from the 1.6% increase projected in June. But a rebound is expected in 2016 with growth of 2.5% as more normal weather conditions resume and agricultural production bounces back. This recovery will be tempered by continued, but lessening declines in the energy sector.

MANITOBA

+2.3%



Manitoba is a growth leader this year, despite a GDP revision to 2.3% from the 2.8% projected in June. The revision reflects weak manufacturing activity (most evident in machinery and fabricated metal manufacturing) over the first half of the year. This weakness was more than offset by strength in transportation equipment and furniture exports. Real GDP growth for 2016 is projected to be 2.7%, down from June's 2.8% projection.

Westport merging with Fuel System Solutions

Combined company will cover more than 70 countries

VANCOUVER — Westport Innovations Inc. and Fuel Systems Solutions Inc. are merging to create an alternative fuel vehicle and engine company.

Westport, based in Vancouver, engineers advanced high-performance, low-emission fuel system and vehicle technologies using gaseous fuels. Fuel Systems Solutions Inc., based in New York, is a manufacturer of alternative fuel components and systems for transportation and industrial applications.

The combined company will



Westport's Ice Pack LNG tank system.

PHOTO: WESTPORT

conduct business in more than 70 countries.

The deal brings the equity value of the combined firms to \$351 million with annual rev-

enues ranging from \$380 million to \$405 million projected for this year. Savings from synergies will be \$30 million.

They'll trade on both the TSX and Nasdaq under the Westport Fuel Systems name and be headquartered in Vancouver, with a new business unit called Fuel Systems Automotive and Industrial Group. This unit will combine Fuel Systems with Westport's

Operations unit; its automotive division will be headquartered in Cherasco, Italy; and its industrial division will be headquartered in Santa Ana, Calif.

Modus wins 2015 BDC resiliency award

Manufacturer recognized for its business turnaround strategy

MONTREAL — Modus Structures Inc. is the winner of the second edition of the BDC Entrepreneurial Resiliency Award presented by the Business Development Bank of Canada (BDC) in partnership with the Turnaround Management Association.

The award recognizes a Canadian company that underwent a business turnaround or pivotal event.

Modus, a manufacturer of modular buildings based in Crossfield, Alta., experienced significant losses in the aftermath of the 2008 recession. The turnaround, which involved diversifying clientelle, selling non-core assets, reducing inventory and other streamlining,



CFO Tom Payne and CEO Cal Harvey of Modus Structures (centre) with René Leduc, vice-president, business restructuring, BDC and Michael Hanlon, president of the Turnaround Management Association, Montreal Chapter.

PHOTO: BDC

preserved 93 jobs, and fuelled strong growth. The company presently employs more than 160 people, a 76% increase from

its 2011 payroll.

The BDC Entrepreneurial Resiliency Award is one of four launched in 2014.

Business owners' confidence wanes

CALGARY — For the first time in the two and a half years small and mid-sized enterprises (SMEs) are feeling less confident, according to ATB Financial's Business Beat index.

More believe their businesses

will be worse off six months from now (33%) than those who feel they will be better off (26%).

Last year almost half (48%) felt they would be better off in six months.

Canfor permanently shuttering Canal Flats sawmill in BC

VANCOUVER — Integrated forestry products producer Canfor Corp. has closed its sawmill in Canal Flats, BC for good.

The mill, which has a two-shift production capacity of 180 million board feet, will end operations on Nov. 9, affecting 65 workers and nine staff members.

The Vancouver-based company said all employees will be offered opportunities to transfer to the company's other divisions.

Canfor president and CEO Don Kayne blamed a lack of economically available fibre combined with depressed market conditions in the oil and gas and lumber markets that the mill serves.

Business Vancouver noted statistics from the Western Wood Products Association show lumber production up 8% at the end of June while prices have dropped 29% during the first eight months of the year.

Vertex acquires fluid management, logistics firms

SHERWOOD PARK, Alta. — Vertex Resource Group Ltd. has acquired Ignite Energy Services Ltd., Glacier Ridge Ventures Ltd. and Tar Energy Services.

The companies provide fluid production hauling and management services, and operate vacuum, pressure, hydro-vac, steam and water trucks.

Vertex, a provider of environmental and industrial services, said the acquisitions will deepen the depth of its oilfield services division by creating a new fluid management and logistics service offering. They'll also broaden the breadth of the company's environmental consulting, and safety and medical divisions.

No financial details were provided.

Ballard inks \$6M tram deal in China

VANCOUVER — Ballard Power Systems has signed a \$6 million joint development and supply deal to commercialize a fuel cell engine specifically designed for integration into low floor trams made by a Chinese rolling stock manufacturer.

The agreements with CRRC Qingdao Sifang Company Ltd. include a 2016 delivery of 10 customized FCvelocity modules.

Ballard, the Vancouver-based clean energy innovator, plans to develop a new prototype configuration of the FCvelocity fuel cell module that will deliver 200 kilowatts (kW) of net power.

CRRC Sifang and the City of Foshan on the Gaoming Line are planning an initial deployment of eight trams starting in 2017.

Ballard is also developing two new configurations of its FCvelocity-HD7 fuel cell module for 2016, expanding the product portfolio for heavy-duty transit applications, such as buses. They'll deliver 30 kW and 60 kW versions to power smaller buses and extend their operating ranges.

Vicwest to open new plant in Edmonton

OAKVILLE, Ont. — Vicwest Inc., a manufacturer of building construction products, has secured a new manufacturing facility in Edmonton.

The company, which serves agriculture, commercial, industrial and residential markets, says its new "Centre of Excellence" based on advanced quality manufacturing systems will open in the first quarter of 2016.

However, Vicwest will be closing its Delta, BC plant at the end of the year. All customers in the west will be serviced from current facilities in Edmonton and Saskatoon until the new plant is operational.

FortisAlberta buys VNM assets for \$16M

CALGARY — The VNM Rural Electrification Association (REA) members have voted to sell their electricity system assets to FortisAlberta for \$16 million.

The sale follows the acquisition of Kingman REA by FortisAlberta, a power distributor based in Calgary.

VNM REA is located in the Barrhead and Westlock County area, northwest of Edmonton.

CCMEC enters second round: launches \$35M carbon competition

EDMONTON — The Climate Change and Emissions Management Corp. (CCEMC) in Alberta is inviting submissions for the second round of the \$35 million international challenge.

The Innovative Carbon Uses competition seeks technologies from around the world that will turn captured carbon dioxide (CO2) emissions into useful products, while reducing greenhouse gas emissions.

In this round, CCEMC, an independent organization that supports Alberta's climate change strategy, is emphasizing projects that reduce GHG emissions by one megatonne annually and will be commercialized in Alberta by 2020.

Submissions are due Jan. 18.

CCEMC will name five second round winners in 2017, each receiving \$3 million. They'll have two years to refine their technology. At the end of the competition in 2019, one project will receive \$10 million to help commercialize the technology.

Visit www.ccemcgrandchallenge.com.

Catalyst sidelines Maine mill's R12 paper machine

RICHMOND, BC — Catalyst Paper is putting its Rumford, Me. mill's No. 12 paper machine on indefinite hiatus.

The Richmond, BC paper company said the decision is entirely market-related. It cited declining demand in North American paper markets for coated paper, used primarily in magazines, catalogues and commercial printing applications.

The machine was temporarily sidelined in May resulting in 51 people being laid off. Catalyst said

additional layoffs are expected.

"We remain committed to making the Rumford operation successful. Year to date, we've invested more than \$10 million in upgrades to the mill, including major maintenance related to the recovery boiler," said Joe Nemeth, president and CEO.

He said the company is also implementing a "proven revitalization program" to increase productivity, and it's developing new, higher-value products to optimize Rumford's production capability.

» Careers

IBC Advanced Alloys Corp., a manufacturer of rare metal alloys based in Vancouver, has appointed **Chris Huskamp** acting president of its subsidiary IBC Engineered Materials Corp. in Wilmington, Mass. Huskamp is an advanced automotive and aerospace materials expert and vice-president of business and technical development since 2014.



Chris Huskamp

Sightline Innovation Inc. has established its Scientific Working Group and appointed HIV/AIDS physician-scientist **Frank Plummer** as its chair. The Winnipeg-based machine and deep learning cloud services company specializes in advanced quality inspection and data analytics servicing multiple industries, including manufacturing.



Frank Plummer

Enerkem Inc., a waste-to-biofuels and chemicals producer based in Montreal, has added **Robert Shaw** to its executive team as senior vice-president and CFO. Most recently he was CFO of Southwest Oilfield Products, a privately-held oilfield equipment manufacturer. The company owns a full-scale commercial facility in Edmonton as well as a demonstration plant and a pilot facility in Quebec.



Robert Shaw

PHOTO: SYLVIE TRÉPANIÉ

Renewable energy developer Finavera Solar Energy Inc. in Vancouver has added **Ken Stadlin** and **Michael Clark** to its board. Stadlin is founder and president of Kenergy Solar, a Washington, DC-based solar installer. Clark is a consultant in the natural resource and project development industry and former senior vice-president of business development for Finavera Wind Energy. **Hein Poulus** and **Peter Leighton**, president and COO, have resigned. **Jason Bak**, founder, CEO and director of Finavera, will replace Poulus as chairman.

Catalyst Paper, based in Richmond, BC, has appointed **Walter Tarnowsky** vice-president and general manager of its Port Alberni, BC mill, and **Graham Kissack** as vice-president, corporate social responsibility. Walter, who joined Catalyst in 2000, was director, paper mill productivity. Graham has played a leadership role in the company's sustainability initiatives since joining Catalyst in 1993.

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» Plastics

Microbeads: A GREEN alternative

TERRAVERDAE BIOWORKS GEARS UP FOR PRODUCTION

A proprietary process successfully produces non-petroleum-based plastics that safely biodegrade.

BY MARY DEL CIANCIO

A small Canadian industrial biotechnology company is trying to change the world by producing sustainable products through an equally sustainable production process. It sounds like a lofty goal, but Edmonton-based TerraVerdae BioWorks is already making huge strides.

Since it was founded in 2009, the company has been focused on developing an industrial bioprocess with a significant impact on sustainability. Fast forward to 2015 and TerraVerdae has a proprietary bioprocess that has shown success in the development of green alternatives to petroleum-derived plastics and chemicals.

In June, the company revealed plans to release its first line of green products. Less than two months later, TerraVerdae had completed the scale-up of its commercial pilot operation to production. These are major milestones for the company of just 15 people who are focused on the opportunities and challenges ahead.

TerraVerdae's production process involves taking "green" methanol derived from natural biomass sources such as forestry or waste residue, and feeding it to single-celled organisms that grow and multiply to produce raw material – the most significant being polyhydroxyalkanoate (PHA), a bio-based and biodegradable bioplastic. The company then extracts this native material and uses it to develop a range of advanced biomaterials with applications in personal care and cosmetics, biomedical, agriculture, automotive, electronic devices and more.

What makes TerraVerdae's process unique is that it also extracts and uses other high-value material from the bioprocess.

First up is a line of biodegradable

natural "microspheres" for personal care and cosmetic products. These are being marketed as a direct replacement for controversial synthetic, non-biodegradable plastic microbeads, currently the subject of restrictive legislation around the world. Synthetic plastic microbeads, used by some cosmetic manufacturers as abrasives in facial and body scrubs, are too small to be stopped by filtration systems in water treatment plants. As a result, they're polluting freshwater bodies, and harming fish, birds and other wildlife in the process.

TerraVerdae's microspheres are a "drop-in" replacement. The distribution and physical properties are the same as microbeads, but they're intrinsically biodegradable, and meet the American Society for Testing and Materials



(ASTM) industry standards for biodegradation in a marine environment. Unlike plastic beads, TerraVerdae's spheres sink in water and they biodegrade in as little as three weeks.

"The market opportunity was pretty compelling," says William Bardosh, CEO and founder of TerraVerdae. "We saw a really nice fit for what we produce."

A number of leading companies, including Johnson & Johnson, L'Oreal and Colgate-Palmolive, have already announced plans to end the use of polyethylene microbeads in favour of environmentally sustainable alternatives.

There are other solutions, but Bardosh warns they come with their own set of concerns. For example, nuts and seeds



PHA microbeads, seen above from pellet form to microspheres, are a drop-in replacement for environmentally harmful synthetic versions. They sink in water and biodegrade in as little as three weeks.



TerraVerdae's Edmonton production facility is equipped with a 2,000 litre pilot-scale bioreactor.

PHOTOS: JEFF HILBRECHT

are one alternative, but you don't get a uniform size distribution when they are crushed, which makes them less ideal. The bigger concern, though, is the water requirements for nut trees. Going this route could create another set of environmental problems, says Bardosh. And other bio-based solutions made from sugar-based fermentation may be compostable, but they're just as non-biodegradable as polyethylene.

Many governments are moving to ban the use of synthetic polyethylene microbeads. The Microbeads Free Waters Act of 2015, for example, was filed in the US Senate and the House of Representatives with the aim of phasing out the manufacture and sale of microbeads found in household products by Jan. 1, 2018.

Some areas are proposing legisla-

tion that may take it a step further to include bio-based solutions. California, for example, has introduced a bill that would outlaw plastic microbeads of any form, which could include TerraVerdae's alternative. Bardosh is working to raise awareness amongst legislators to ensure his microspheres aren't lumped in with the synthetics and non-biodegradable bio-based materials.

Canada is actively developing regulations that will prohibit the manufacture, import and sale of personal care products containing microbeads, but the text

WHY EDMONTON?

TerraVerdae's principle development facility is in Edmonton, but the company also has activities in the US and UK. Though CEO William Bardosh, a Canadian, is actually based in Boston, there were a number of factors that drew him to base the company in Edmonton.

He cites the strong support network from the government of Alberta, as well as the technical talent from the nearby University of Alberta. In addition, the location gave his team access to excellent resources and facilities for fermentation scale-up.

Bardosh was also attracted to the city of Edmonton's focus on generating valuable products from waste, because he is like-minded.

And the company found a valuable collaborator in Enerkem. Its waste to methanol production facility in Edmonton is the company's major green methanol source.

of those regulations has not yet been released, so it's not clear whether the language will include bio-based alternatives. Bardosh, however, doesn't expect it to pose a problem for TerraVerdae with its global market.

In fact, there are a number of markets in the US and Europe where legislation has already been passed, or is being passed, which provides a significant opportunity for TerraVerdae to sell its products.

uct that comes out of this at the end has to have the same composition and the same characteristics each time."

There are many challenges facing technology companies today. For TerraVerdae, the biggest ones have been funding, as well as finding qualified people and an industrial space with the right equipment. But the company has faced all of these challenges head on and generated revenue in the process.

"We have set out to undertake a significant challenge, which requires strong support and collaboration..."

With no major concerns about the impact of legislation on his company, Bardosh and his team are moving full steam ahead. TerraVerdae is already working with several major personal care product manufacturers to test the use of microspheres in their products, doing everything from lab tests and analyzing formulations to efficacy testing.

In the meantime, the team is trying to optimize the process for full-scale commercial production. This involves careful planning.

Pilot to commercial scale

As vice-president of bioprocess development for TerraVerdae, Ian Gosling is responsible for scaling up the bioprocess – figuring out how to translate what the team has seen in the laboratory and pilot scale into full commercial production, in addition to determining a location and the equipment to be used.

The team has run the bioprocess at a 10,000-litre commercial pilot scale several times over the last few years at a facility in the UK. Full commercial scale would run anywhere from 200,000 to 250,000 litres.

This involves a lot of logistics, because as you move up in scale, you're using different equipment, often in different locations. Finding the right environment takes time, but it ultimately helps to validate the process and confirm its robustness under a variety of conditions.

The company is working with partners to get there. At the same time, it's continuing to improve the process, including at the 10,000-litre scale, to ensure the yield is high and the process is reproducible.

"You really need to make sure the process is robust [and] that it will work every time," Gosling explains. "The prod-

Bardosh attributes this success to four main factors: vision, people, capabilities and collaborations.

The company remains focused on its vision of changing the way the world develops, produces and consumes products that are sustainable and that meet or exceed the performance criteria of their non-sustainable displaced counterparts.

To help bring this vision to light, Bardosh has selected a great team with a broad range of backgrounds and strong expertise – a competitive advantage for TerraVerdae as it works from feedstock to end product.

Collaborations with academic and industrial stakeholders have also been essential.

"We have set out to undertake a significant challenge, which requires strong support and collaboration from a range of stakeholders, which he describes as key for defining and driving solutions.

TerraVerdae received funding support from various sources – including Alberta Innovates Bio Solutions, Alberta Innovates Technology Futures, the federal IRAP program and others in the US and the UK.

The TerraVerdae team is working on a portfolio of products and plans to release two others later this year or early 2016 when the company is in full production.

It's a long and challenging road from pilot to production, but TerraVerdae remains focused on optimizing its bioprocess to produce sustainable products – and change the world in the process.

Mary Del Ciancio is a Stouffville, Ont.-based business writer and editor. E-mail mary@marydelciancio.com.

Comments? E-mail jterrett@plant.ca.



TerraVerdae's green biochemistry platform is key to its biomaterial development, including bio-based polymers and chemicals.

Innovation

» Carbon Capture

SaskPower and BHP Billiton will establish a knowledge centre to speed up the global development of carbon capture and storage technology.

BY PLANT STAFF

BHP Billiton and SaskPower have formed a partnership to accelerate the global development of carbon capture and storage (CCS) technology.

They're going to share access to the data, information and lessons learned from SaskPower's \$1.4 billion Boundary Dam facility, which the utility describes as the world's first "full chain power" carbon capture project.

According to the companies' Memorandum of Understanding, BHP Billiton, a global supplier of coal for industrial use and power plants, will help establish an international knowledge centre to promote research and reduce the cost and risk associated with new CCS projects.

About 41% of the world's coal supply is used to generate electricity, according to the International Energy Agency in France. The World Coal Association says 76% of the world's coal is used by China, the US, India, Russia and Japan. About 39% of US electricity is produced using coal. The US is also the world's second-largest coal producer. Saskatchewan has an abundant supply of coal used in power generating units that produce 70% of the province's greenhouse gas emissions.

This controversial technology is capable of capturing up to 90% of the carbon dioxide (CO₂) emissions produced from electricity generation and other industrial processes that use fossil fuels. And the Carbon Capture & Storage



Flue gas ducting (pictured) extending from the carbon capture facility, and connecting to the power station (not pictured).

PHOTO: SASKPOWER

Accelerating CCS

PARTNERSHIP TO SHARE BOUNDARY DAM PROJECT SUCCESS

Association based in the UK claims CCS used with renewable biomass is one of the few carbon abatement technologies that takes CO₂ out of the atmosphere.

CCS involves three components: capturing, transporting and storing the CO₂ underground in depleted oil and gas fields or deep saline aquifer formations.

"To respond effectively to climate change, we must develop and deploy a wide range of low emissions technologies more quickly than the usual commercial timeframes. But progress remains too slow," said Dean Dalla Valle, COO of BHP Billiton Canada Inc.

The three components have been successfully demonstrated for many years by the Boundary Dam project, but he said "much more investment and many more projects are needed to bring down the cost of technology and accelerate its deployment."

Boundary Dam involved rebuilding a coal-fired generation unit with the carbon capture technology and was brought online last year. The facility produces 120 megawatts of base-load power and is capable of reducing greenhouse gas emissions by one million tonnes of CO₂ annually.

Selling byproducts

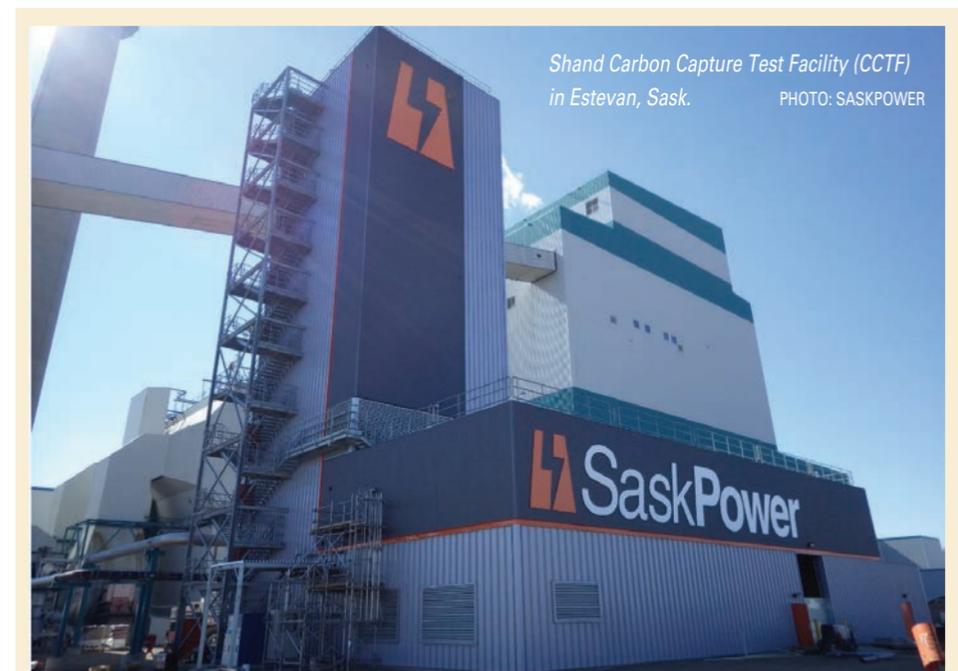
Captured CO₂ is sold and transported by pipeline to nearby oil fields in southern Saskatchewan for enhanced oil recovery. CO₂ that's not used is stored in the Aqistore Project, located on SaskPower property approximately 2 kilometres west of the power station. The CO₂ is injected 3.4 kilometres underground into the Deadwood Sandstone Formation below the Williston sedimentary basin, which is made up of many layers of porous and non-porous rocks.

Other byproducts captured from the project are sold. Sulphur dioxide (SO₂) is converted to sulphuric acid and sold for industrial use. Fly ash is sold for use in ready-mix concrete, pre-cast structures and concrete products.

Critics cite the high cost of CCS, the fear that the stored gas might escape, and note the technology doesn't eliminate the CO₂.

The Pembina Institute, a Calgary-based energy think tank focused on reducing the harmful impacts of fossil fuels, neither endorses nor opposes the Boundary Dam project, but has offered qualified approval of CCS. It said the size of the investment required risks diverting money from other low impact renewables and conservation measures needed to clean up Saskatchewan's energy supply.

Comments? E-mail jterrett@plant.ca.



Shand Carbon Capture Test Facility (CCTF) in Estevan, Sask. PHOTO: SASKPOWER

TESTING LAB OPENS IN ESTAVEN

SaskPower has launched its Carbon Capture Test Facility in Estevan, Sask.

The CCTF, built in partnership with Mitsubishi Hitachi Power Systems Ltd., is a high-tech laboratory that uses a small amount of flue gas from the nearby Shand Power Station to test equipment, chemical innovation and engineering designs in a controlled environment.

Mitsubishi is the lab's first client. It's testing a new amine, a chemical solvent at the core of many CCS processes.



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» Cleantech



AN EMISSIONS REDUCTION GAME CHANGER

Carbon Engineering's technology aims to produce renewable, synthetic hydrocarbons, but could also remove CO2 from the air.

BY DAVID KENNEDY

Nestled beneath the scattered peaks overlooking Squamish, BC, a stone's throw from the shore of the calm Pacific inlet known as Howe Sound, a Canadian company is quietly nearing the completion of a facility that could rewrite the book on hydrocarbon fuel, and potentially turn back the clock on climate change.

Hydrocarbon-based fuels – such as diesel or gasoline – are considered in many circles to have outlived their usefulness, causing more damage to the environment than they give back as simple and accessible forms of energy.

Despite the stigma, Calgary-based Carbon Engineering is not convinced the age of hydrocarbons is necessarily over. But unlike a conventional energy company, the six-year-old cleantech outfit is planning to leave the petroleum in the ground. It may not be the easiest or most conventional way to produce hydrocarbons, but Carbon Engineering is wholly dedicated to pulling – or scrubbing – carbon dioxide (CO2) from the air and using it to produce synthetic hydrocarbon fuel that has an ultra-low or no carbon footprint.

“If you're just looking to produce CO2 that somebody can use in an industrial or a commercial setting, there are cheaper ways to get it than scrubbing it out of the air,” says Geoffrey Holmes, business development manager at CE.

But as CE engineers know and what is becoming abundantly clear to energy companies, emissions regulations and environmental impact costs are quickly changing the cost equation of traditional energy.

“Our business strategy rests on monetizing the benefits of the CO2 and of the environmental benefits of having scrubbed it from the air,” Holmes says. “It's sort of a closed-cycle way of powering transportation that can be carbon-neutral.”

CE uses a contactor to scrub CO2 from the air. First, large fans push regular air through plastic sheets that are pumped full of a liquid solution. The CO2 is absorbed into the solution and collected in a large tray. The remaining air is filtered off, while the CO2-rich solution is funnelled and pumped toward the regeneration stage. The regeneration process isolates the CO2 to produce

synthesis fuels for storage. The liquid solution can then be pumped back to the contactor and reused.

CE's system uses thermal energy for the majority of the CO2 extraction process. Its demonstration plant will be powered by natural gas to generate the required energy, but CE noted as solar prices continue to tumble, all stages of the process could run on renewable energy. In that scenario, when the synthesized hydrocarbon fuel is burned, its CO2 emissions would be 100% offset by the CO2 captured to produce it. Even if the company uses natural gas to meet the thermal demand and solar to power the electrical and fuel synthesis equipment, the process is capable of reducing the carbon footprint of hydrocarbon fuels by 85%.

Decarbonize transportation

“This system can, in principle, either be used to provide low-carbon fuels that help de-carbonize the transportation sector, which actually might be cheaper than a lot of our other options, or it's also a system that in the future can be used to compensate for emissions that are more costly or difficult to mitigate at source,” Holmes says.

“Let's say you've got a whole lot of little sources of CO2 that you just can't capture or alter the equipment to emit less or whatever, you could in principle build one air capture plant to capture the equivalent amount of emissions...”

One of the major – and often overlooked – issues surrounding replacing oil and gas is the massive investment required to replace existing infrastructure. Though low-carbon or carbon-neutral fuels are playing an ever-increasing role in the world's energy mix, and carbon taxes as well as cap and trade programs are cropping up in Canada and in many jurisdictions worldwide to incentivize the change, traditional hydrocarbons still make up the most significant part of the world's energy consumption. According to the most recent International Energy Agency data, oil accounted for 40.7% of the world's total energy consumption in 2012.

CE's synthetic hydrocarbons, with a significantly lower or even neutral carbon impact, would leave existing infrastructure intact – not requiring every combustion engine on the planet to be scrapped or converted – and allow hydrocarbons to remain part of the world's energy makeup at a fraction of the environmental cost.

Synthesizing greener fuel makes up the backbone of Carbon Engineering's business plan, but the company has also investigated one alternative strategy for its technology.

It could be used to extract CO2 from the air on a large

CE's pilot project scrubbing CO2 from the air.

PHOTO: CE

scale and store it, effectively eliminating one of the key drivers of climate change.

CE's pilot project is designed to scrub only two tons of CO2 from the air daily, but the company said a full-scale facility would be capable of pulling as much as one million tons.

Holmes notes, “It's one of the very, very few approaches that could sort of wind the clock back in terms of CO2 emissions in some future scenario where we've made drastic cuts and we're finding out this isn't enough.”

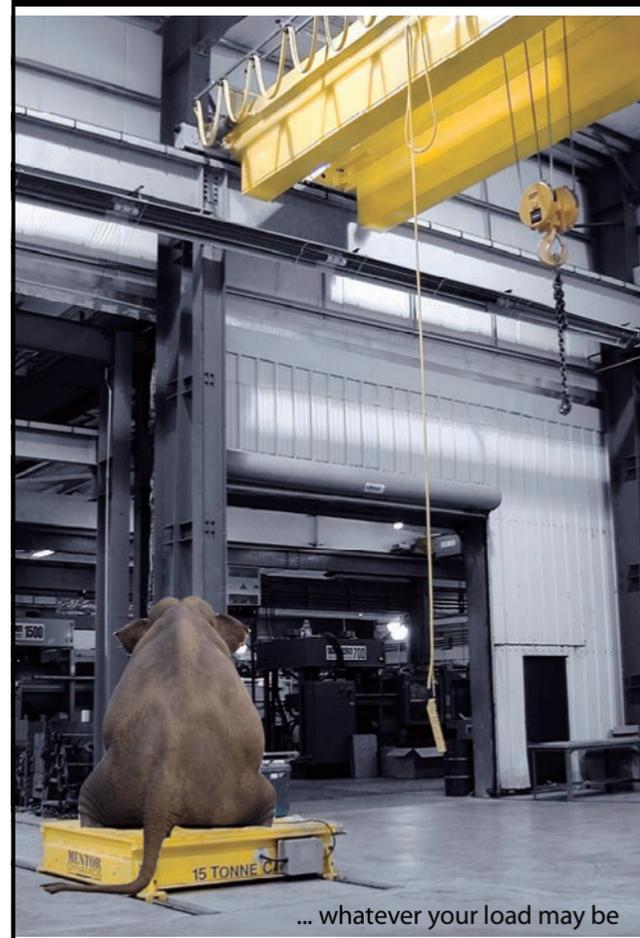
David Kennedy is an online reporter with CanadianManufacturing.com and regular contributor to Cleantech Canada.

Comments? E-mail jterrett@plant.ca.

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» Software

Cap Op Energy automates and standardizes data acquisition to streamline equipment performance and air emissions reporting.

BY MATT POWELL, ASSOCIATE EDITOR

Cap Op Energy is trying to do what no other company in Alberta's oil patch has done before: make sustainability profitable.

A lofty goal indeed, the Calgary-based company's Distributed Energy Efficiency Project Platform (DEEPP) software platform drives home the message to high CO₂-emitting oil and gas producers that sustainability is more than a line item in the "cost" column of quarterly financial reports. Yet "cost" column thinking may very well explain the amount of push-back from Canadian industry.

"The new government in Alberta has made it clear that there's going to be a renewed focus on energy efficiency in the oil patch," says Cooper Robinson, Cap Op's manager of strategy and finance. "Our technology helps producers make energy efficiency projects viable by aggregating smaller projects under a



SUSTAINABILITY made PROFITABLE

SOFTWARE PLATFORM MONETIZES CARBON OFFSETS

DEEPP calculates carbon offsets for large CO₂ emitters. PHOTO: THINKSTOCK

relatively small but repeatable projects that result in a significant payoff.

The DEEPP platform, conceptualized in 2012 by Cap Op's founder Adam Winter, automates and standardizes data acquisition and handling to streamline equipment performance and air emissions reporting. The tool also integrates asset management and emission reduction reporting, and includes real-time reporting on project results to quantify greenhouse gas credits (carbon offsets) through cloud computing and project aggregation.

The company claims it successfully brought forward 40,000 tonnes of GHG offsets in 2013. So far, DEEPP users have saved \$5 million of fuel gas and also delivered \$2.4 million to customers in carbon offsets totalling 160,000 tonnes of CO₂.

Compliance instruments

Carbon offsets represent a reduction in CO₂ emissions that compensate for an emission made elsewhere. In Alberta, one carbon offset represents the reduction of one tonne of carbon dioxide equivalent in GHGs. Carbon offsets are compliance instruments currently used in places around the world including Alberta, BC and Quebec, and soon by Ontario under the Wynne government's Cap and Trade program. California uses them as a mechanism for compliance and allows offset trades with Quebec.

Cap Op's proprietary, scalable, cloud-based quantification platform allows customers to develop the offsets from a large number of small projects, which Robinson says is particularly valuable to oil and gas companies because many of their smaller well sites together have potential to reduce a large amount of emissions.

"Individual projects aren't always viable offset project candidates because they might be too big to complete affordably," he says, adding the platform reduces overhead and cost quantification projects by up to 50%. "Our software goes after smaller installations that have a bigger impact."

For example, instead of going after a compressor engine with a few thousand horsepower, Cap Op's platform targets smaller pieces of equipment and aggregates a large number of them because it's relatively affordable to swap out equipment such as high- to low-bleed pneumatic devices.

"We want to go after the lowest hanging fruit to have the greatest impact in the shortest amount of time," says Robinson.

Cap Op's DEEPP platform could be a game-changer in Alberta's drive towards oil and gas energy efficiency by simply giving producers a great reason to get serious about sustainability: it can make them money.

Comments? E-mail mpowell@plant.ca.

single platform that provides a viable offset project to make and save a company money."

Indeed, an unpublished report from July 2014 released by *The Canadian Press* Sept. 28 suggests raising Alberta's price on carbon emissions to \$50 per tonne, a 70% increase over current levels, would be the best way to reduce the province's greenhouse gas emissions.

In June, premier Rachel Notley and her NDP provincial government announced a plan to boost the province's existing carbon levy on large emitters starting in 2016 as a bold first step in a much broader climate change plan. The current \$15 per tonne carbon tax will increase to \$20 next year and \$30 in 2017. The current system introduced by the former Conservative provincial government also requires industrial facilities that emit more than 100,000 tonnes of CO₂ equivalent per year to cut emissions intensity by 12% below a baseline. But the NDP will increase that requirement to 15% next year and 20% in 2017.

Environment Canada data reveals Alberta accounts for 36% of Canada's greenhouse gas emissions, but account for 11% of the population. Ontario is home to 39% all Canadians but accounts for only 24% of overall CO₂ emissions, despite a strong industrial (mainly manufacturing) presence.

Cap Op is positioning its technology as a key tool to help oil and gas producers make the Alberta government's lofty climate change goals more manageable and even profitable. The company believes the key to oil and gas energy efficiency lies in encompassing a large number of

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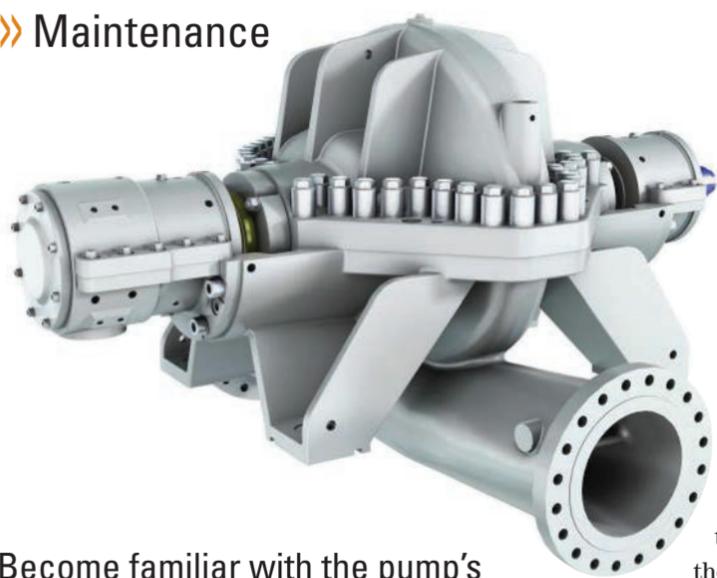
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» Maintenance



Become familiar with the pump's proper performance, closely monitor its operation and correct problems as quickly as possible.

BY STEVE GAHBAUER

Pumps are critical to plant operations. A breakdown could be costly. Signs of trouble will become evident – likely at the most inconvenient time. That's why it's important for maintenance pros to be several steps ahead of potential problems.

Failure causes such as unevenly worn parts, bent shafts, loose impellers and signs of corrosion or abrasion usually become evident when a malfunctioning pump is pulled and disassembled.

Here are some tips for successfully troubleshooting pumps from a presentation by Michael Dufresne, customer support services at Sulzer Pumps (Canada) Inc., to the Society of Tribologists and Lubrication Engineers (STLE).

Horizontally split pumps

Axially split casing pumps are sealed by a gasket and the pre-tension of the flange bolting. Axial positioning is critical for impeller sidewall clearance.

Between bearing double suction (BB1) pumps have a heavy-duty horizontally split casing that permits inspection, maintenance and removal of the rotating unit without disturbing the piping or motor. The double-suction impeller provides high efficiency and low NPSH values.

Renewable casing wear rings protect the bearing and assure smooth flow to the impeller. The wear rings are locked in the lower half of the casing to prevent rotation. A high-strength duplex stainless steel shaft with a double-ended design is standard on BB1 pumps, providing high corrosion and wear resistance.

A renewable stuffing box bushing further protects the casing from wear. High-thrust spherical roller bearings (lifetime of more than 100,000 hours) are protected by non-contact, wear-free labyrinth seals.

Double volutes reduce radial loads acting on the shaft and bearings. This allows smaller shaft diameters and bearing sizes, resulting in cheaper shaft seals and more economical pump performance.

Maintain clearances on between bearing multi-stage (BB3) pumps, keep balance lines clear and throttle bushing clearance. Warm-up is critical.

Add a gasket with the correct thickness and watch for pipe strain, soft foot, high temperature case and foot torque.

Overhung pumps

In most end suction centrifugal pumps the radial or line bearing, located closest to the stuffing box, handles most of the radial loads put on the impeller. The other bearing in the power end of the pump, located close to the coupling, is the thrust bearing.

Low or medium speed pumps usually have oil bath lubrication. The oil should be at the centre of the lowest rolling element. The proper level is maintained by

Looking for pump TROUBLE

HOW TO ACHIEVE PEAK PERFORMANCE

a constant level oiler.

A single centrifugal pump impeller generates thrust in the direction of the suction eye, keeping the shaft in tension. On small low-pressure pumps the thrust is relatively small. But as pressure rises, the thrust must be compensated for to avoid the need for larger bearings. Balancing holes relieve the pressure on the back shroud by providing a flow path to suction, which reduces axial thrust. Close-fitting clearances between the impeller and the casing also help reduce the pressure on the lower part of the rear shroud by throttling the flow.

Vanes on the rear shroud pump the high pressure liquid back into the main flow, thus reducing the pressure acting on the back shroud.

Keeping water and moisture out of overhung pumps is a problem. Using flinger rings is usually the most effective way to protect bearings from moisture. Since bearing life is directly related to heat it's best not to keep the

TROUBLESHOOTER CHECKLIST

- Maintain fits, impeller balance and oil levels.
- Use balanced closed-loop oilers if condensation is a problem.
- Make sure O-rings are round with a correct profile.
- Use bearing isolators to keep oil clean and water out.
- Maintain alignment, running clearances and suction plate running clearances in open impeller pumps.
- Use appropriate bearings with correct internal clearance.
- Set back-to-back thrust bearings with correct loading.
- Maintain end float.
- Never mix balanced and unbalanced impellers to avoid thrust problems.
- Focus on measuring, trending and recording.

oil hot. Many commercially available pumps don't have enough oil capacity. The minimum should be two litres.

Grease or lip seals have a useful life of about 2,000 hours, equal to 84 days when the pump runs 24 hours per day. There are some superior, new labyrinth seals that come with a static O-ring.

Vertical pumps

VS1 pumps are for vertical duties that require medium pressures. VS3 pumps are for vertical low head/high flow duties, such as cooling water. VS6 pumps are used for low NPSH applications, such as condensate extraction in power stations, and for pumping hydrocarbons in refineries. Here are some performance pointers:

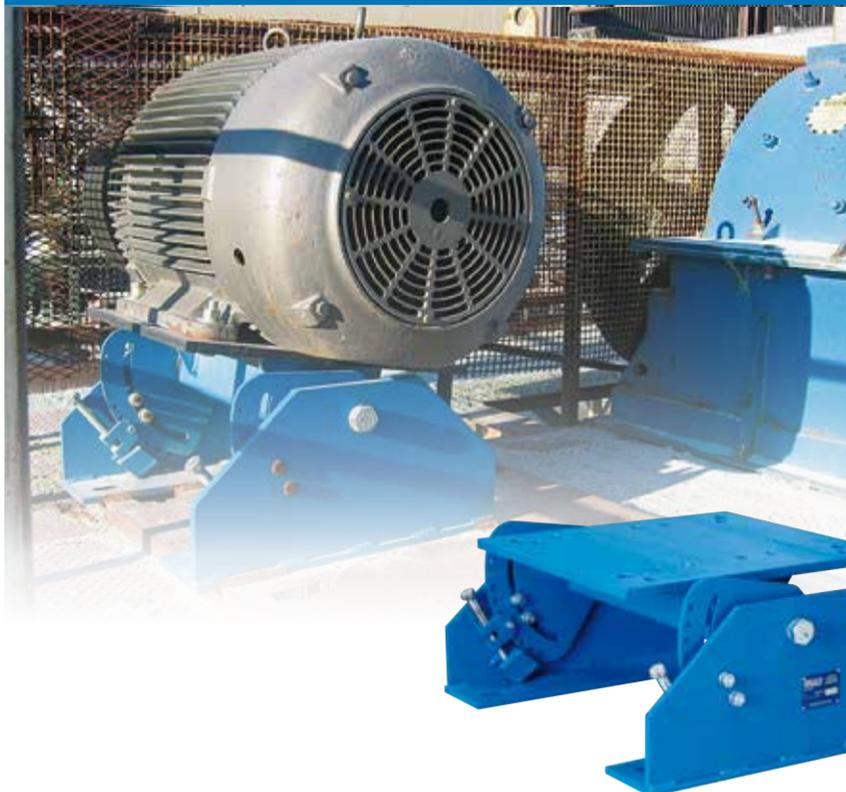
- Maintain lift on open impeller designs; centre stationary and rotating wear rings correctly on closed pumps.
- Maintain oil, grease or water flush on shaft-enclosing tube designs.
- Set packing for constant leakage, finger-tight to start. Only tighten packing while the pump is running.
- Maintain concentricity on the motor, stand, stuffing box, bearing retainers and bearings.
- Check for wear pattern on shafts and bearings; correct as needed.
- Upgrade materials as required by the process.
- Check the discharge head for pooling water.

Whatever the type of pump, once "normal" is established, pay attention to day-to-day changes and watch for trouble ahead.

Steve Gahbauer is an engineer, a Canadian business writer and a regular contributing editor to PLANT. E-mail gahbauer@rogers.com.

Comments? E-mail jterrett@plant.ca.

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CANADIAN INDUSTRIAL EQUIPMENT NEWS

» Plantware



Monitored with MTConnect FDI.

WORKHORSE LEGACY EQUIPMENT GETS CONNECTED

5ME's new Freedom Digital Interface (FDI) with integral MTConnect adapter monitors the performance of legacy machine tools using Freedom eLOG, or other MTConnect monitoring software.

Older CNC or manual machines lacking ethernet ports are monitored with the small, self-contained, DIN rail-mounted assembly. The FDI has eight digital inputs (24 VDC or 120 VAC) and two analogue inputs (0-10 VDC).

The eLOG software suite automatically extracts critical manufacturing data for web-based reports and analytics on asset utilization, availability, performance, quality and OEE. And it integrates seamlessly with ERP, MES, maintenance and quality business systems that can be accessed anytime via smartphone or tablet device.

5ME, based in Cincinnati, provides asset monitoring and manufacturing efficiency software, cryogenic machining systems.

<http://5me.com>



Multi-network connectivity.

COMPACTCOM COMMUNICATES PROFINET QUICKLY

The Anybus CompactCom 40-series from HMS Industrial Networks Inc. has passed certification for PROFINET Version 2.31 for applications that require conformance class (C) and netload class III certifications.

Multi-network connectivity is focused on industrial ethernet and high performance applications.

The 40-series version supports RT Class 1 and 3 and comes with an integrated IRT ethernet switch. There's also support for MRP, Clock-Synchronous Operation, Fast Start Up and PROFIenergy functions.

There's a black channel interface for PROFI-safe communication, used in conjunction with the IXXAT Safe T100 safety module.

IT functionality includes a socket interface to send a complete ethernet frame (up to 1,500 bytes), built-in web pages, file system, and firmware upgrade via FTP.

There are also security functions with encryption to prevent illicit copying.

HMS Industrial Networks is a supplier of industrial communication products based in Chicago.

www.hms-networks.com

TELEMETRY

SENTINEL NODES MANAGE DATA REMOTELY

SignalFire Telemetry has expanded the interface capabilities of its remote sensing system to support a wider array of sensors in the remote management of assets in challenging outdoor environments such as oil fields, water systems and mining.

Remote transceiver Sentinel nodes interface with sensors, extract data and send a long-range transmission of data in unlicensed ISM bands that sustains signal strength through terrain, structures or weather.



Long-range transmission.

Three new Sentinel nodes expand the system's range of analogue, digital, Modbus and HART modules to provide more monitoring and control options.

Sentinel Thermocouple interfaces with K- and J-types to report temperature, ambient temperature, error status and diagnostic information. It takes a temperature reading and sends data via the SignalFire wireless mesh network to a Gateway where data is available through a Modbus RTU or TCP interface.

Sentinel Turbine provides a sensitive pulse pick up with a direct connection to a turbine flow meter and monitor frequencies between 1 Hz to 2 kHz with a minimum sensitivity of 30 mV.

Sentinel Load Cell works with standard mV/V (Wheatstone Bridge) load cells for measurements on moving devices.

SignalFire Wireless Telemetry is a developer of wireless telemetry products based in Hudson, Mass.

www.signal-fire.com

SAFETY



300 or 400 mm beam gap.

LIGHT CURTAINS ENHANCE MACHINE ACCESS

AutomationDirect's Contrinex YCA 50-series safety light curtains provide

protection when open access might be required during machine design applications.

The 24 VDC curtains are available with either a 300 or 400 mm beam gap, as well as configurable operating distances of 1-15 and 10-50 m. Protective heights range from 832 to 1,232 mm. Fitted with an M12 quick-disconnect, there are dual PNP outputs and the curtains have Type 4 and Cat 4 PLe safety ratings and are IP65 and IP67 rated.

YXC light curtain mirror columns are also available to provide multi-sided safeguarding. They're impact resistant and built with a spring return in case of accidental contact. Mirrors are available in 1,060 to 1,874 mm lengths.

AutomationDirect is a supplier of industrial automation products based in Cumming, Ga.

www.automationdirect.com

TRANSFORMERS



Isolation to 4,250 Vrms.

GATE DRIVES ISOLATE MOSFET, IGBT DRIVERS

Pulse Electronics Corp. has expanded its P0584/85NL high isolation gate drive transformer line with a new series that uses insulation wire on all windings so they're compliant to the IEC61558 and IEC60601 safety standards.

The P0584/85NL series provides isolation in MOSFET and IGBT drivers for industrial applications, such as motor drive circuits, solar inverters and power supplies.

Three versions extend to applications that require higher levels of safety and isolation with 30% increased isolation capability (to 4,250 Vrms) and 20% greater volt-second capability.

The gate drive transformers are RoHS compliant meet standard EIA481 requirements and UL recognized/TUV-certified to IEC 60950.

Pulse Electronics is a manufacturer of industrial electronics based in San Diego, Calif.

www.pulseelectronics.com

SENSORS



IP67-rated, CSA class II approved.

SENSORS DETECT SHAFT, GATE AND SLIDE POSITION

4B Components Ltd.'s P8003V10C and P8004V10C proximity sensors are fitted with solid state relays for speed monitoring applications that require a pulse output up to 120 VAC/VDC for PLC integrations.

Both sensors also detect shaft, gate or slide position as well as object presence.

For speed monitoring applications, the sensors are used with 4B's Whirligig guarded target and mount, which is available with 1, 2, 4 or 8 pulse targets. It attaches to the rotating shaft by either a 1/2 in. tapped hole or magnetically. There's no contact between the sensor and the object being monitored.

The corrosion and abrasion resistant sensors are fully encapsulated in a polycarbonate body. They're dust-tight and waterproof (IP67-rated) and CSA class II division 1 groups E, F & G approved for hazardous dust environments.

4B is a manufacturer of material handling and electronic components based in Morton, Ill.

www.go4b.com/usa

LIGHTING



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LEDS REDUCE ENERGY CONSUMPTION BY 55%.

Appleton Electric's Code-Master LED explosion-proof luminaires are engineered for Class I, Division 1 hazardous environments and deliver 110 lumens per watt to improve energy efficiency in harsh, corrosive or hazardous industrial environments by up to 55%.

They're specifically suited for oil refineries, chemical processing plants

and where other ignitable vapours and dusts are present. They're ideal for both new construction and in retrofit applications where the housing threads into existing mounting hoods of the company's Code-Master HID without rewiring or mounting locations.

A heavy duty, copper-free aluminum housing with a baked epoxy powder coat finish enhances durability. The lights are rated to NEC/CEC code requirements for Class I, Div.I, II and III; IP66/67; NEMA Type 3R and 4X for wet locations; and Marine Outside (salt water).

The lights minimize maintenance requirements and generate more than 60,000 hours of lighting, thus reducing relamping frequency part replacement maintenance and costs.

They're available in 70 to 400 W with pendant, ceiling, wall bracket and 25-degree stanchion mounting options, all with an Acme double lead threaded design for quick installation.

Appleton is a manufacturer of industrial electric and lighting products based in Rosemont, Ill.

www.appletonelec.com

TUBING

TUBES HANDLE EXTREME HEAT

A metal sealing ring built into Parker Hannifin Corp's Seal-Lok Xtreme O-ring face seal tube fittings allow them to



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Applications include combustion turbines, LNG storage and fueling systems, cryogenic equipment gigh-temperature engine compartments, instrument panels and chemical process equipment.

Parker Hannifin's tube fittings division manufactures tubes, fittings and hoses in Cleveland.

www.parker.com

TOOLHOLDING

TOOLHOLDER BOOSTS MATERIAL REMOVAL RATES

SCHUNK's SINO-R toolholder handles heavy-duty cutting, including the rough stuff.

It's based on an expansion technology system with a solid body and a pressure medium that quickly clamps the cutting tool by using a spanner wrench to simplify operation and decrease machine downtime.

High radial rigidity and superior dampening characteristics increase productivity by lengthening tool life and boosting material removal rates. Application flexibility is increased thanks to the use of intermediate sleeves.

The SINO-R holds the tool securely, with a maximum torque transmission of 850 Nm (627 ft-lb.) at a clamping diameter of 32 mm. It's precision-balanced, standard to G 6.3 at 15,000 rpm.

SCHUNK is a manufacturer of clamping and gripping systems with Canadian operations in Mississauga, Ont.

www.ca.schunk.com



Torque transmission of 850 Nm.

TUBE BENDING

TUBE BENDER CONSOLIDATES FABRICATION

BLM Group USA's 4-Runner electric tube bender consolidates four fabrication steps into a single continuous process.

It's configured as a dedicated tube bender for a specific production application or a complete process that includes straightening from coil, bending, end-forming and cut off.

The system is flexible and lowers investment costs due to process integration. Operators bend both right and left hand, in fixed and variable radius bends and three-dimensional planes, within the same cycle to enhance flexibility, productivity and accuracy.

The unit handles small to medium sized tubes and bends diameters up to 22 mm with accuracy to ± 0.05 in. on the x axis and ±0.05 degrees on the y and z axis.

VGP3D, a 3D visual graphic program for constant machine monitoring, enhances performance and operator ease of use. The program also generates a single machining program easily by entering geometric part data to simulate the feasibility of the bending operation, changing running sequence in simulation mode and calculating cycle time in advance.

The Wixom, Mich.-based company says the 4-Runner is best suited for HVAC applications, but also works in a variety of industrial applications.

A 2.76 in. maximum bending radius is standard, but increasing it is an option.

www.blmgroupp.com



Handles diameters up to 22 mm.

» Events

CESSCF 2015

Junewarren-Nickle Energy Group

Oct. 28, Calgary

The Canadian Energy Supply Chain Forum (CESSCF) brings together buyers and sellers along the energy supply chain. Visit www.supplychainforum.ca.

Global Exports and Management of Supply Chains

CME-BC

Nov. 3-4, Coquitlam, BC

This two-day FITTskills session identifies the stages of a global supply chain, covers the required documentation to move goods across borders and the different methods to enhance the performance and efficiency of international logistics. Presented by Canadian Manufacturers & Exporters – BC, in partnership with EDC and FITT. Visit www.enterprise-canadanetwork.ca (click on Events).

FABTECH 2015

SME

Nov. 9-12, Chicago

A North American metal forming, fabricating, welding and finishing event produced by SME, the Fabricators & Manufacturers Association, International SME, Preci-

sion Metalforming Association, American Welding Society, and the Chemical Coaters Association. Visit www.fabtechexpo.com.

2016 AHR EXPO

International Exposition

Jan. 25-27, Orlando, Fla.

The international heating, ventilation, air conditioning and refrigeration gathering features more than 2,000 exhibitors, plus education sessions. Visit www.ahrexpo.com.

ISCEA Supply Chain Technology Conference and Expo

ISCEA

July 19-21, Chicago

ISCEA's annual gathering brings together supply chain, operations, engineering and financial professionals to share technologies and best practices focusing on efficiency and profitability. Visit www.sctechshow.com.

RAPID

SME

May 16-19, Orlando, Fla.

Presented by SME, the RAPID conference and exhibition covers 3D printing, scanning, and additive manufacturing. Visit www.rapid-3devent.com.



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Hypocrisy and the 'fossil free' movement

BY GWYN MORGAN

Since the dawn of the Industrial Revolution in the mid 1700s, fossil fuels have transformed mankind's journey in almost every conceivable way. Agricultural production has soared, transportation was revolutionized, electrical power enabled breathtaking technological advancements and petro-chemistry has provided synthetic materials for everything from fertilizers to heart valves.

Real GDP per capita has soared by more than 1,600%, in lock-step with the

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per capita growth in fossil fuel consumption. Harnessing our planet's enormous endowment of natural hydrocarbon energy is the greatest factor underpinning the huge gains in virtually every aspect of humanity's remarkable progress. And the technological advances made by approximately one million workers who unlock those buried resources have been equally profound.

But now those workers and the companies that employ them are being attacked

as environment destroying pariahs in a global anti-fossil fuel war that aims to cripple their financing and destroy their livelihood.

Last February, an international group calling themselves Fossil Free disrupted the opening of stock exchanges around the world. The occasion was a so-called “Global Divestment Day” aimed at convincing shareholders of corporations “who have become rogue entities seeking profits at the expense of people and

planet” to divest their holdings.

The group claims their advocacy has stimulated a \$50 billion reduction in fossil fuel investments. That number is likely exaggerated but the movement is definitely gaining traction.

In Canada, the General Council of the United Church has voted to drop fossil fuels from its investment portfolios, saying the decision is based on “the Christian duty to care for the earth.” Divestment campaigns are under way at some 30 Canadian universities including the University of British Columbia and University of Toronto where professors have voted to urge portfolio divestment. Victoria City Council recently passed a motion asking the provincial Municipal Finance Authority to allow divestment. And just last week, the Canadian Medical Association announced it's doing the same.

Target the user

But most greenhouse gas (GHG) emissions are caused by users of fossil fuels. Environment Canada's website states, “Globally, almost 80% of GHG emissions from human sources come from the burning of fossil fuels and industrial processes. Specific activities include . . . vehicles, electric production, heating and cooling of buildings, operation of appliances and equipment, production and transportation of goods, and provision of services and transportation for communities.”

In Canada and other oil and gas producing countries, the proportion of GHG emissions from hydrocarbon production is higher than the global average, but even our much vilified oil sands produce only about 0.01% of global GHG emissions.

The only way to impact emissions is to target the users, who are, of course, everyone. So why aren't those university professors, who fancy themselves as intellectually rigorous thinkers, calling for divestment of the shares of companies that use fossil fuels? And if, as those church leaders, doctors and politicians believe; fossil fuels are morally wrong, shouldn't they be boycotting their own use of fossil fuels? No driving, no air travel, no road or rail transported food, no natural gas heat for their houses, no electricity from fossil fuelled power plants. And those passionate Fossil Free divestment activists must also target any company that uses fossil fuels in its production or distribution system, which means virtually all companies.

Without hydrocarbon energy, the global economy would shut down. Ironically, if producers failed to supply user demand, the public would be outraged.

Gwyn Morgan is the retired founding CEO of EnCana Corp. and has been a director of five global corporations. This column is distributed by Calgary-based Troy Media.

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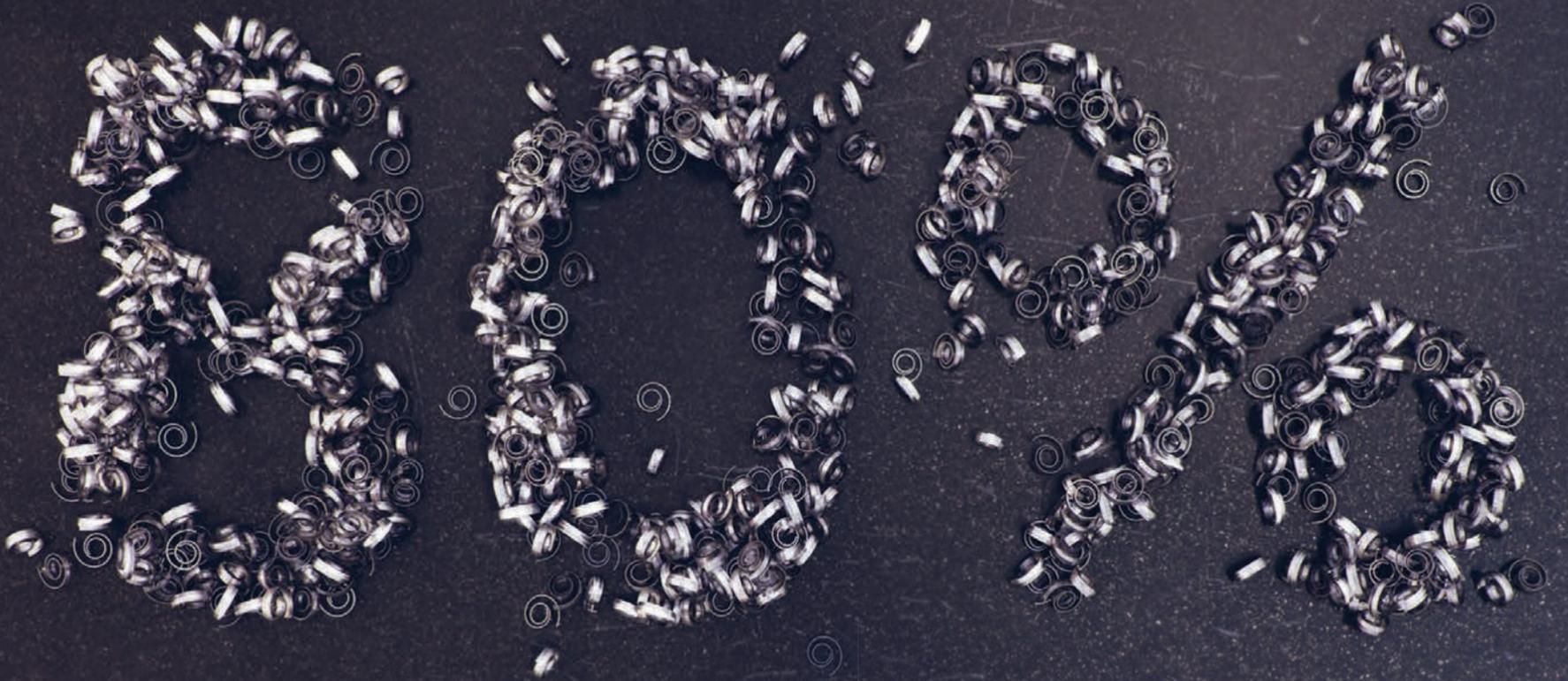
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